

UNDERGROUND PUBLIC SPACE FOR PEOPLE

Dealing with light and space

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TFM



To God, thank you for all of the knowledge and blessings obtained during this process.

To my tutor Josep Maria Fort, for his support and guidance.

To my family, friends and all of the people who accompanied me though the process and supported me along the way.

Abstract

A filter of light and city, negative interventions, to let the above flood by light into the mass of the subsoil. "The light and the gravity are the only elements capable of piercing the thinking of the stone"¹

The light reaches the underground only as zenithal light. Classified in three forms: direct, redirected and filtered, permitting the underground to be perceived as an integrated space by converting the underground line division, as a filter of light.

Today, the subsoil is a non-place, a space of transition and intermediation between two points of the above, and it contains buried pieces of forgotten history. It is almost never a destination, due to its main role of transporting elements, it is a non-place. Today in some cities it is still a serving space, destined only to support the above.

Why is the subsoil still retaining the same characteristics now a day, if it could solve so many other problems not only of space but

density and experimentation in the city?

Integrating the subsoil into the city is a very efficient way to improve the growth and the revaluation of the built zones and a way to take advantage of neglected buried spaces. Adding to it new uses, besides transportation, such as activities that provoke permanence. And finally physically integrating underground spaces to the urban fabric and thus achieves being part of fundamental system of public space.

The public space above is characterized by natural light, we receive sunlight in a plaza or a park and we have visibility to other elements: we are in an "exterior". But In the underground today it's a complete different story, therefore this lack of perception, of natural light and visibility make these spaces isolated. A space is observable only when there is light and then is when it is inhabitable.

¹ Alberto Campo Baeza

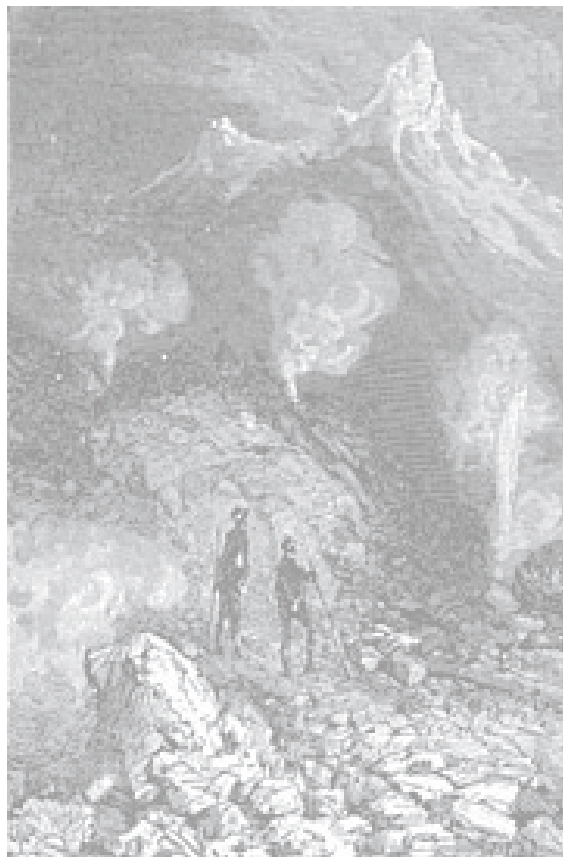
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The background is a dark, textured surface, possibly a wall or floor, with a yellow geometric shape on the left side. The word "Introduction" is written in yellow on a dark grey background.

Introduction



IMG. 64
Journey to the center of the
world _ Julio Verne

The underground has always been an intriguing and mysterious place. There is a reason why, or better said a preconception held in our minds for why the human have conquered skies but not the subsoil. "The journey to the center of the world" is Jules Verne's only book that hasn't come to reality.

The underground is mostly perceived as a negative substitute to the surface, but taking it into consideration could arise many of its undiscovered qualities, and as always pushing architecture to the limit can stir creativity and lead to beautiful works.

Even though the subsoil has an important role in the construction of the metropolis today, it is not really an integrated part of the city; it is present only through necessity. This is due to many reasons, but mainly because of its functions of transportation "the fluids rather the space itself"² and it's limited relation with the city above.

It is of interest to discover and experience Barcelona from another other point of view. Because it is an un-discovered world but at the same time, ironically contains pieces of history, like if it was already lived and forgotten. In Barcelona's underground are so many elements that are being held waiting, and screaming for being integrated or re-discovered.

² Josep Maria Fort. Quaderns



Now a day, I believe Barcelona is the result of two parallel cities that share a line that divides them, the ground floor line. Being these two cities dependent one to the other but not really integrated. The underground city as a non-place and the upper city as the place of events.

The aim is to understand the reason why this happens and explore the possibilities for the integration, finding a medium, for the hidden underground city to the visible above city. Also, it is intended to create new relations and opportunities for the city to improve and so, provide new experiences that the city is denying.

Zenith light is the "medium" this research will focus on, because it is considered one of the main differences between both and the one capable of humanizing places. A space is inhabitable only when it is visible.



Img. 67
Time After Time 2016. Florencia Alvarado



Img. 68
Time After Time 2016. Florencia Alvarado



***“The dream
of the me-
tropolis is
being built in
the subsoil “***

– Marcel Meili



Why Underground?

There are many reasons why to study the underground, besides of its mystery and preconception that the people has to it as a negative solution for the surface, it could provide certain possibilities that could improve our already built cities. Learn other ways of growth and improvement it's part of the evolution.

The use of the subsoil in our cities was limited until more or less a century ago. The technological advances of the twentieth century and the increased need for greater urban comfort has led to intensive building both above and below ground-level. This constitutes a radical change in the way we understand cities today.

"In the midst of all the issues of densification, people are striving to be inventive and find a way to deal with the increasing population. When attempting to find new places to build, an interest in the subterranean rises and discussions spur. Many architects state that the new way of urban growth is with a downward direction.

³.Below ground level. Floris Alkemade- OMA. Pag. 52

⁴.Below ground level. Floris Alkemade- OMA. Pag. 82



"In the Netherlands, limited space, soft buildings ground, the country heritage and increasing concerns about the environmental are leading, without a shadow of a doubt, to a downward orientation. The emerge of the 3d city, one extending both above and below us, with addresses at different heights and depths, seems inevitable. In such environment, the ground level will disperse into various at once, the square will be replaced by a void, the street by lifts, ramps and escalators. The development of the underground – and therefore the birth of the 3d city- will however, only succeed of the way is paved psychologically. Users will have to learn to perceive subterranean space as being of equal value to that above ground level."³

Different from high buildings and rooftops, the underground, is right below our feet. If you think about it, in a plaza there are facades responding, dialoguing and surrounding it, but, why is not the ground floor line also considered as another façade? In many cases, like in dense cities, could be the

Montreal, Canada

La Ville interieur



Currently, under an important part of the city of Montreal there is the what so called "Ville Interieur", a pedestrian network in the city center. 30 km of underground streets and squares that hold 500,000 people every day and relate to 60 different real estate. The relationship between the workplace and the mode of transport has been and is a sine qua non for the viability of these underground pedestrian areas.

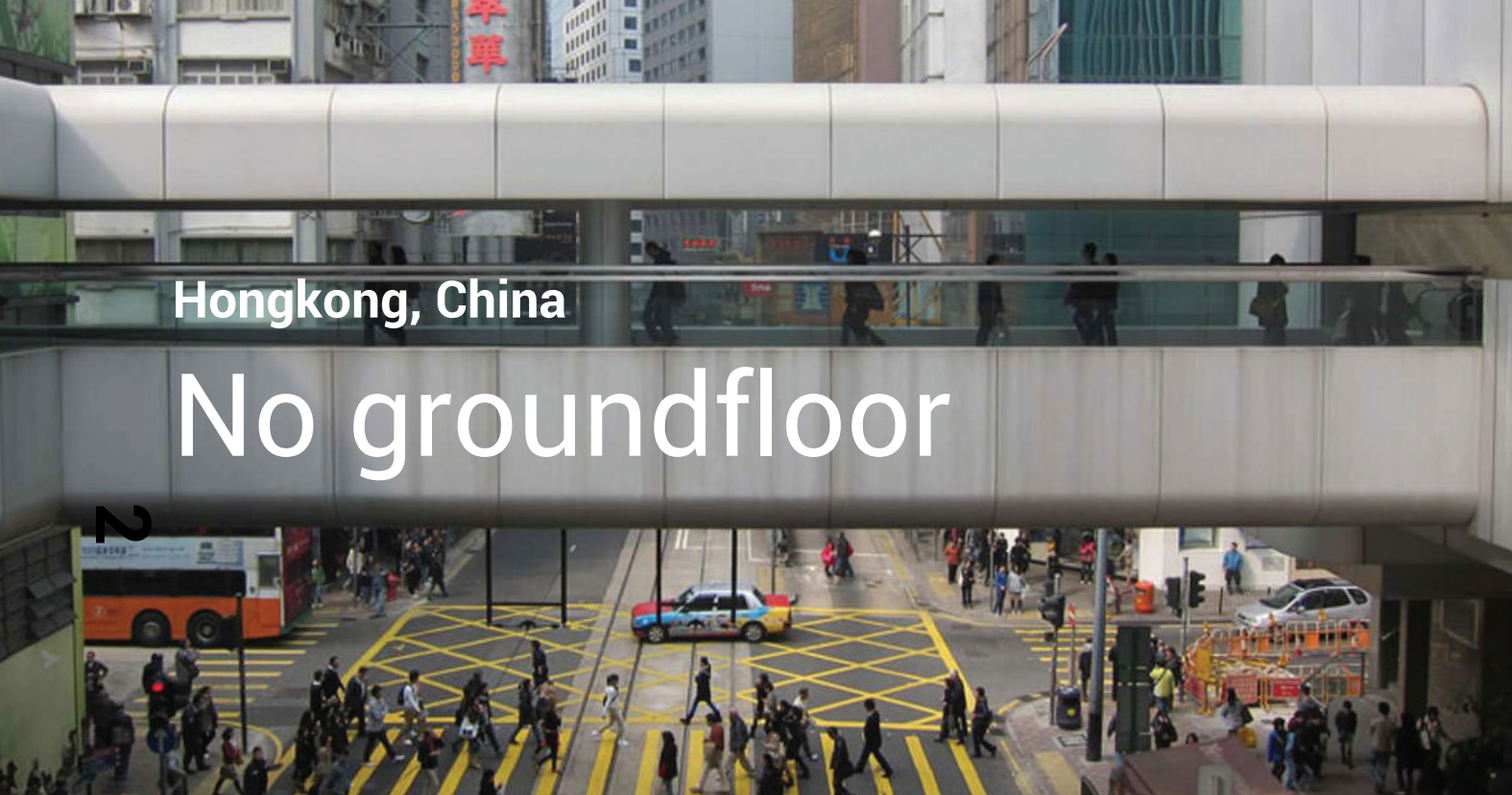
The genesis of this important underground network comes from the beginning of the last century, when the arrival of the transcontinental railway in the new downtown urban fabric leaves a scar that was the nightmare of the time and has been the seed In-terieur de la Ville.

Montreal went underground also because of the cold. The intention was to contrast the temperature of the above and below, but conserving the same light, essence and identity.

Img. 69

Hongkong, China

No groundfloor



A city without ground
a hong kong guide book, ORO, Adam frampton,
johnatan de solomon, Clara Wong.



Img. 71



Img. 72

A city without ground
a hong kong guide book, ORO, Adam frampton, johna-
tan de solomon, Clara Wong.

**Its height of buildings and com-
plexity needed a different ground to
respond to this city. The ground floor
line is now three-dimensional.**

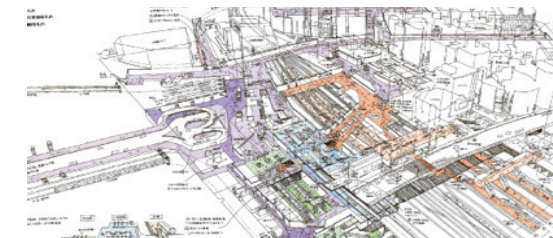
Hong Kong is a city without ground. This is true both physically (built on steep slopes, the city has no ground plane) and culturally (there is no concept of ground). Density obliterates figure-ground in the city, and in turn re-defines public-private spatial relationships. Perception of distance and time is distorted through compact networks of pedestrian infrastructure, public transport and natural topography in the urban landscape.

Without a ground, there can be no figure either. In fact, Hong Kong lacks any of the traditional figure-ground relationships that shape urban space: axis, edge, center, even fabric. Cities Without Ground explores this condition by mapping three-dimensional circulation networks that join shopping malls, train stations and public transport interchanges, public parks and private lobbies as a series of spatial models and drawings.

Img. 70

Tokio, Japan

Shinjuku



Img. 73



Img. 74

**The main motivation for doing
this on subsoil use is given as a pri-
mary cause issue: congestion affect-
ing specific surface on the metropoli-
tan area.**



Img. 75

It is the world's busiest railway station, handling more than two million passengers every day. It is served by about a dozen railway and subway lines, including the JR Yamanote Line. Shinjuku is also one of Tokyo's major stops for long-distance. Highway large bus terminal, named Busta Shinjuku, is conveniently located on top of the railway station.

Given the high underground construction is created in Japan in 1987 an organization to evaluate the potential of the underground city -urban Underground Space Center of Japan- trying to set a property and implement joint planning methods soil and subsoil. Compel administrations to think and regulate the city in three dimensions and have finally managed to disengage the deep subsoil of private property by making it public.

New York, United States

Lowline Park

2



Img. 77

The Lowline is a plan to use innovative solar technology to illuminate an historic trolley terminal on the Lower East Side of New York City. The vision is a stunning underground park, providing a beautiful respite and a cultural attraction in one of the world's most dense, exciting urban environments.

The use of sunlight and the connection with its surroundings is the key for the "low line" to function.

Img. 76

Paris, France

Reinventer Paris



The picture is an example of one of Paris's government contest to reinvent its underground.
www.reinventer.paris

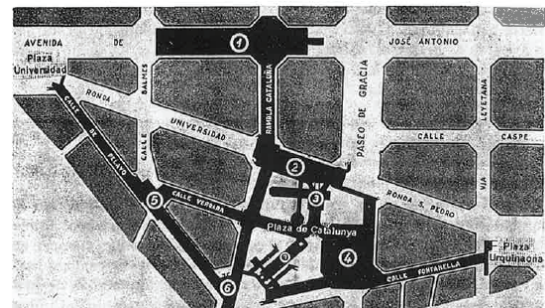
Barcelona, Spain

Avinguda de la Llum

2



Img. 79
Interior view
Avinguda de la Llum



Img. 80

The Avinguda de la Llum is a now closed underground mall in Barcelona, the first one of its kind to open in Europe, open between 1940 and 1990, on a 2000 square-metre site built in 1929 and boasting 68 commercial establishments, including a movie theater.

It was underneath Carrer de Pelai, between Plaça de Catalunya, Carrer de Balmes, Carrer de Bergara and Plaça de la Universitat, over the Ferrocarrils de la Generalitat de Catalunya (FGC) station Catalunya, between its vaults and the street.

The idea was to create a underground commercial area that connected several plazas but at the end it failed because the connections were not build. It resulted as a dead end corridor.

The name Llum means light, and it was meant to attract people to this lightened underground space.

Each city constructed or reacted depending on each one of their necessities. Anyhow, some key points and similarities were found in all of them.

First of all, they are all public spaces and well connected to the urban fabric. Different to Avinguda de la Llum that did not work because of the lack of that continuity.

All of the underground study cases are located in central and strategic areas in the cities.

Mixing different uses, La ville Interieur and the Sinjuku station, where both at first only destined for transportation. But are now what they are because of their multiuse programs.

There are three cases that are using light as a strategy to inhabit the underground. The Low line and Avinguda de la Llum by taking light to the underground with technology, each one updated to its time. Montreal Resó by the use of translucent materials to let the natural light go down.



Under Barcelona Today



Img. 81
Tercer hombre
New York
2021



Parallel cities

This chapter will focus of the study of Barcelona's underground. But to comprehend it well, it must be understood the relation with the upper city, because the underground is completely dependent to it even though they are completely opposite one to the other.

Having in mind other cities analyzed in chapter two, and how these two parallel cities connect or interrelate; it is necessary to discover what would be the one for Barcelona.

Some aspects will be analyzed such as Movement (Static vs. Fluid), Space (Negative vs. Positive), Perception (Hidden vs. Shown), Connections



(Continuity with its city), activities (Functional vs. harmonious). For two things to interrelate, merge, dialogue, they have to have to speak the same language at least, or have a common medium.

“The underground is a non-place, a parallel non-city that collides with the skin of the terrain that obsessively controls her; an absence that reminds us of Graham Greene’s third man, implicit but non existent, comprehensible and justifiable only by the reduction to the absurd and literally invisible, present only through necessity”.⁵

5. Josep Maria Fort. Quaderns.



Barcelona's Surface
Img. 82



Barcelona's Subsurface
Img. 83

Un-relations

Movement

Static vs. Fluid

ω

The underground is used as a space for mainly movement, currently in Barcelona there is no static space on the subsurface being used. The important quality is the transportation of elements from one side to another that connects with the surface with the surface.

It seems paradoxical but the underground that is so dense, works with a fast fluid, different from the above. On the surface there is free space and the predominant elements are static. Free space and dispersed movement.

On the underground the important element is not the duct, but rather their dynamics of transport. Characterized by flow, and complementary to the static city. This city, the static one, contain

Identity

Identity vs. No identity

The surface contains the seen elements, there for, there are architectural or natural aspects that shows us and characterize a place, serving as a constant reference, and to which architecture seems to bound. "Architecture belongs to the place, and the place is defined by its peculiar light; is one of the essential attributes for understanding the architectural problem".⁶ On the underground, no identity is identified, could be wherever, lack of light, of views of identification, of belonging.

Space

Negative vs. Positivet

Space on the above ground is empty, completely negative. Underground is completely positive. Human intervention and inhabiting is completely the opposite to it's nature. To inhabit the negative – you build in positive, and to inhabit the positive, you build in negative.

Aboveground buildings are seen from the outside, they are elements placed filling the negative, inhabiting in positive. On the underground, is the contrary, Instead of adding elements, we inhabit by subtraction.

The horizon and the "shown" has an effect of understanding the place.

The lack of the horizon, and perspective on the belowground like metro stations, makes you feel "out of control" of the situation, because you are conditioned to follow pre-established routes that you are not able to see or perceive where are they leading you.

Underground is all about the negative, the hidden space, shaping and condition that inside-space. No chance to see it from the outside, only inhabit it. Façade-less spaces.

Perception

Hidden vs. Shown

A consequence from the negative and positive spaces is the hidden and shown perception of the space. Finding a building aboveground it is easy to be seen and but discovering one on the underground is not discoverable that easy. Hidden means some-

Activity

Served vs. Serving

thing that is unseen, not discoverable. Shown refers to something exposed, seen. This is directly influenced with light, no light, no visibility.

Above, you perceive the whole space, because you know you are able to perceive it. Underground, you depend of a human intervention, on a conditioned way or path. "You don't have a reference for what is going on, no elements to identify, no identity and no sense of time"⁷.

Everything happens above the ground floor, all types of activities, public, private, basically all of the spaces in the upper city are for the people. Millions of regulations are established to control space. The underground has basically no-restriction. In Barcelona it is only used for infrastructure, metro, functional purposes, basements and historic elements left behind all in benefit and serving to the upper city. It is not for people. These spaces are only fluid or containers controlled from above.

"Reality has replaces extension by superimposition of activities; activities superimposed on different levels can be separated only by a few meters and can establish diverse relationships between themselves at the surface. If we direct our gaze towards what is happening under our feet, collectors and sewers appear as the outer ring of a long chain of installations and services that permit the existence of an apparent world, emerging before our very eyes and the origin of their need."⁸

Groundfloor line division

Barcelonas's ground floor is a continuous 2d plane, with a 3% slope that starts on the mountains and ends under the water. This plane is basically never broken. Only perforated for functional reasons. It is a border and a physical limit between the parallel cities.



Img. 84



Img. 85

By this un-relations, Barcelona's underground is non-place. The underground would stop being a non-place when it becomes a destiny, other uses rather than transport and easy access would permit permanence and they could be more human because of the natural light. Light would break the sensation of tunnel.

⁶. Valero Ramos, E. La materia intangible

⁷. Towards an underground architecture, Laba Press Basel 2013.

⁸. Josep Maria Fort. Quaderns.

C

ould
natural light
contribute to recover the
u n d e r g r o u n d
as an
inhabitable
human
&
urban space





Hypothesis



Img. 86 Tindaya. Eduardo Chillida



If we understand the subsoil as a “non-place”, a filled mass and darkness then the Natural Zenithal light could influence as medium for the subsurface to be integrated with the city above. By negative interventions, opening space, or perforating the filled mass with light would allow the perception and visibility of not only below but also of above, making references and abolishing the isolation feeling when inhabiting it. By this, also permitting other activities for them to be permanent and full of identity.

“The zenith light is the release of the darkness of an interior and the genesis of a pure formal adventure”⁹.

“Only light and gravity are capable of breaking the thinking of the stone”¹⁰.

⁹ Elias Torres.

¹⁰ Campo Baeza.



Taking the underground city through light



Img. 87. Magritte

Natural Light specifically zenithal will be the element of focus in this chapter, because its believed that the connection of the underground with the surface could be achieved, in a very large way, with the control of this element, also, for other several reasons explained on the following paragraphs.

Without light, it's impossible for human to inhabit. Like the architect Eliza Valero states on these following quotes:

"Light is the energy that makes life possible."¹¹

"Through the light architecture is humanized when it guides the man."¹²

Also, light is the one responsible of making the space visible, as simple as it sounds; the space needs to be seen. "Space begins at the limit of tangible

material and reaches us in the interaction of light and shadow"¹³. Not only seeing the space, but also revealing us locations, time, elements of reference, etc.

These elements of reference could be from the upper city. Thanks to the perforation of light could be establishing an interchange of information between both. This same action could give identity and a sense of belonging, because the user could identify or relate to familiar elements such as a building, or the feeling of daylight. "Architecture belongs to the place, and the place is defined by its peculiar light; is one of the essential attributes for understanding the architectural problem".¹⁴

And at last, light has the ability to change the perception of space, and so as well, could change the perception of the level where you are standing. This could be very helpful at the moment of accessing the underground building. By the managing of light the transition could be subtler and not abrupt. The building is not only the building; it is also how you transit it, (making allusion to Le Corbusier's Promenade). Also, for the same reason, it will contribute with the abolition of the psychological paradigm of the rejection of going down to the subsoil.

^{11, 12, 13, 14} Valero Ramos, E. (2004). La materia intangible

Zenithal light

The aim is to study the inclusion of light for the connection with the upper city. There is no direct horizontal light input to the underground. Therefore only cases of zenith light are studied.

"The zenithal light comes from above, either from a window on the top of a wall, or from an opening in the cover that illuminates an interior space or that can be considered close to an interior."¹⁵

"In architecture, the zenithal light is that which comes from above in the interiors, or in exteriors that have something inside. For the light to become present or take shape, the existence of the covers is necessary"¹⁶



"The zenithal light is the release of the darkness of an interior and the genesis of a pure formal adventure"

Elias Torres.

Analysis Zenithal light

study cases

Only cases of zenithal light (definition explained in page XX) will be studied and analyzed. The aim is to finding answers of the ways zenithal light enter the underground; What are those types and what relations with the surface that could generate. In brief, How to use the light to create the relations?

The analysis of the study cases, threw a result of 3 groups and 3 layers of analysis with sufficient similarities. Of course, there are many intermediates or mediums. Which is very convenient because this permit us to manipulate and mix characteristics depending on what we need.

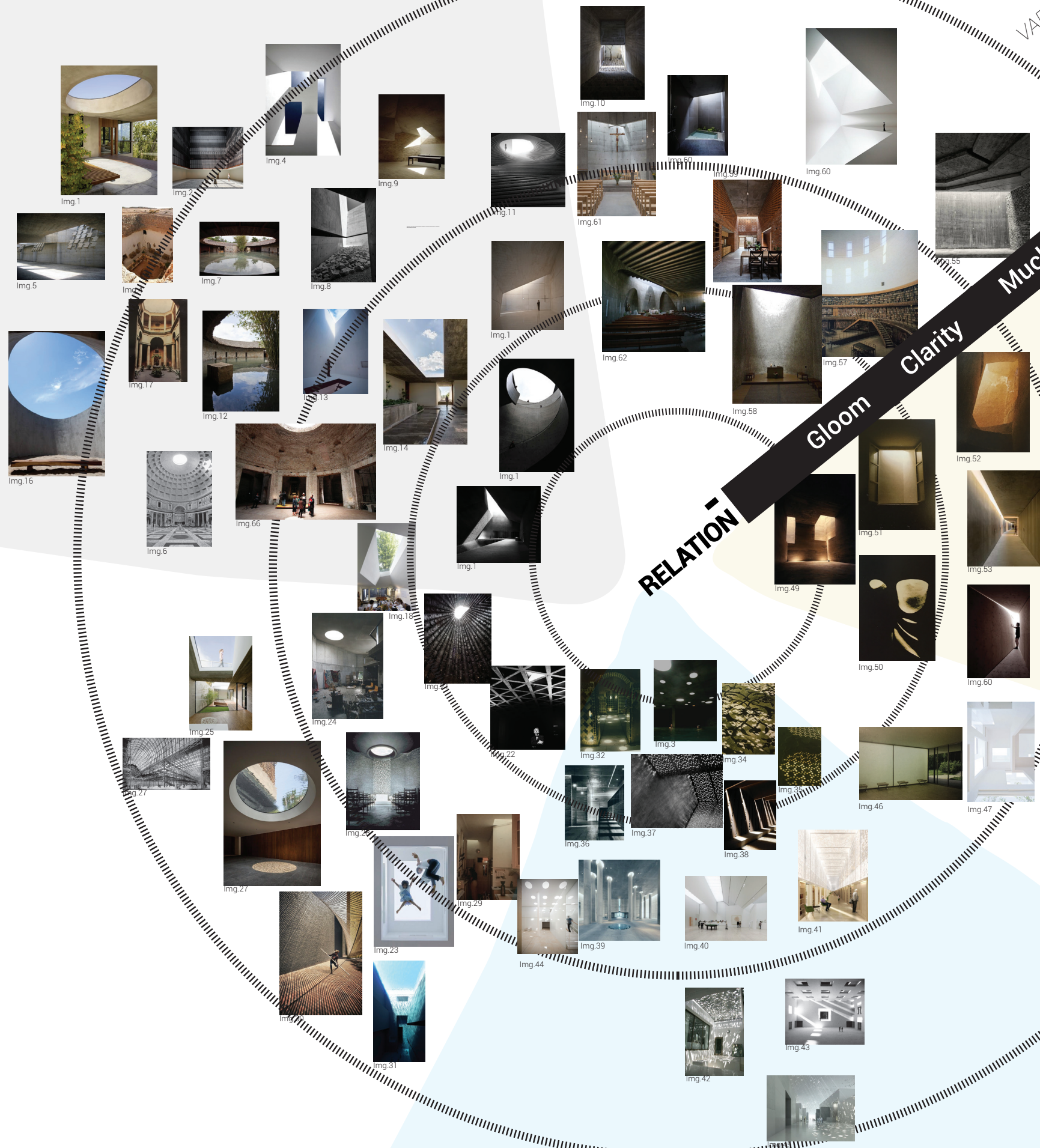
The first layer of analysis is the way for the light to enter the underground. It was discovered that the zenithal light could enter the underground in three ways. Direct, redirect and filtered (PAGE XX detailed explanation of each). There are some exceptions or better called mediums, that possesses characteristic of two groups simultaneously.

The second layer is about the relation with the upper city. At first, It was believed that the 3 classifications of entrance could offer constant qualities per each group, but it was demonstrated false. All the classifications can offer different levels of relations with the exterior, because this condition is not related to the type of light. It is related to the visibility, and clarity. All of the types could offer a very big relation or a very little one. Depending also on proportions of the architecture.

The clarity is the relation of quantity between shadow and light. There could be found two extremes; complete shadow: darkness, or complete light: glare. On both, because of the presence of only one of the elements, no connection could be provided. More shadow than light generates gloom, very little relation. Basically the relation is proportional more light, less shadow, more relation . More light than shadow, clarity, more relation, more visibility.

DIRECT

VARIATIONS



RELATION

Gloom

Clarity

Much Clarity

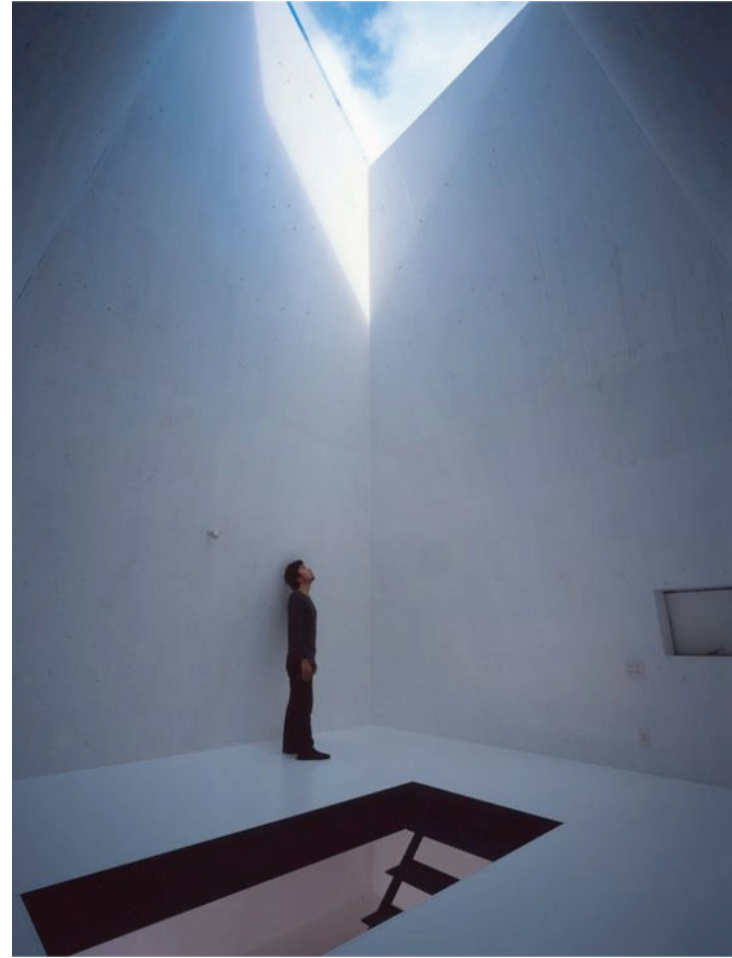
+ RELATION

RE-DIRECTED

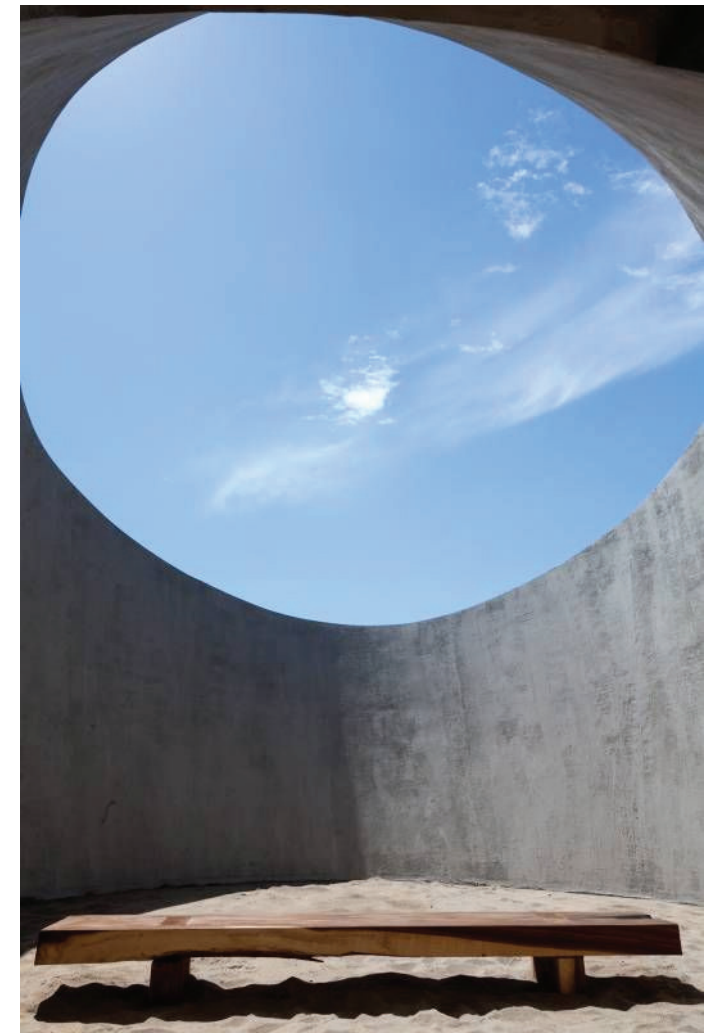
VARIATIONS

FILTERED

Analysis



Img. 13



Img. 16

Direct

The first type is the direct light entry.

As the word definition says, it is "Pure, without interventions, influences, factors, etc.; immediate – proceeding in a straight line or by the shortest course; straight; undeviating; not oblique."

Like it is explained, it doesn't have any filter, is the purest way of receiving the light.

These three examples show how the same entry type, direct, could offer connection or gloom, more or less connection, depending on the proportions of the space.

This type of is ideal for the sense of exterior; it is the one best for open public spaces such as plazas.

t y p e # 1



Img. 24.

Analysis



Img. 50

type # 2

Img. 49



Re-directed

The second type is the redirected light. Its definition is: "To change the direction or focus of".

This light is being redirected, so it basically enters the space in a horizontal way or another direction rather than vertically. This is the only type that doesn't have an equal level of complete relation with the exterior because it doesn't provide visibility due to that same re-direction.

More or less shadows and light proportion gloom and clarity levels. It is kind of always feeling as an interior because of the lack of visibility.

It could be useful for spaces that only need light but the visual connection is not necessary for the use.



Analysis



Img. 38



Img. 3

t y p e # 3

Filtered

The third type is the filtered light.
Its definitions are:

"Element that has been removed, blocked, or separated from certain elements."

"Something that works like a filter, as by removing, blocking or separating out certain elements."

"To remove by the action of a filter"

As its definition states, it is the most altered one because it's in a way transformed, by another element – filter. So it basically depends on that specific filter.

The filtered light as the direct one, have the possibility to provide more or less connection, and at the same time, depending on the level of that filter, that could let pas visibility or a sense of interior/exterior.

This type of light permits lots of control.



Img. 42

Analysis



Direct & Filtered

As explained before, there are of course some exceptions to the rule. Some cases can be in one group by definition, but contains also similarities with another group.

In this example, by definition, is a filtered light, but the filter is so soft and delicate that offers a quite good visibility, that when the water is calmed, it can basically feel as a direct light.

Img. 27

Analysis



Filtered & Redirected

Because of the dimensions and amount of the perforations you can think it's a huge filter. The light is filtered to enter in many directions, so you cannot see the source, or where is it coming from, so you could think also of a redirected type.

Img. 47

variation # 3

Direct & Redirected

Depending on the location and the proportion of the space, in this case, the light is entering from the zenith, but we perceive it horizontally, you are not able to see the source, unless you are directly standing below it. So, it could fit on both groups.

Img. 61

+

0

Underground Public Space for People

/ 5



Analysis

Strategies

This analysis gave us some strategies that will be applied in the project proposal in chapter 7.

The combination of the above surface elements and the underground elements would be the one determining what type of light you can provide (direct, filtered or redirected) and manipulating it with architecture, and so, generate a certain level of relation or not.

The uses in the underground would be not only for movement, but providing other uses that promote permanence, making the underground also a destination.

The way of getting to the underground will be subtler, for it to be part of the fundamental system of urban tissue.

Of course, the intervention will not be capricious; it will be intended to improve the above surface.



Design Proposal

Location

7

The area of intervention of the project is located in the heart of the city in the Ciutat Vella district, specifically in the axis of an important intersection between Via Layetana and the Avinguda de la Catedral.

That area contains the most antique history, not only on the surface, but also in the subsoil. Under via Layetana remains the first subway line constructed in Barcelona.

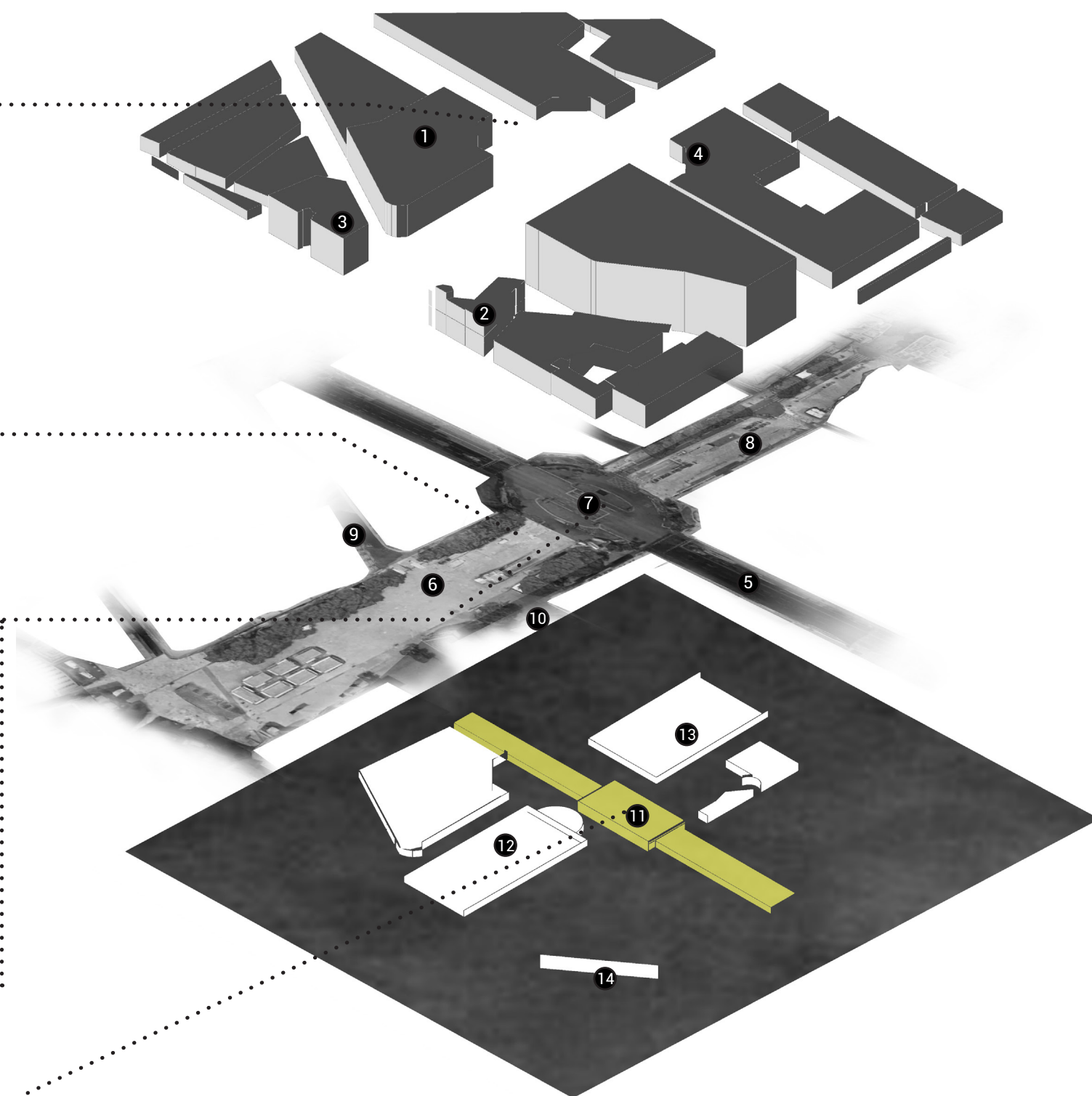
Current situation

There are many elements on this area, on the upper ground important historic buildings such as The Cathedral of Barcelona or Barcelona's first banc, and the remaining's of the Barcino's walls also presence in the underground. Newer items like Mercat de Santa Caterina, of architect Enric Miralles.

Besides the wall, on the subsoil, there are also, the ruins of the convent Santa Caterina (under the market) the metro 1 line neglected station called "Banc". This station was never opened to the public, because the design plan changed when it was already built. But there are a lot of rumors that it was a hidden, secret place used by bankers. Anyway, it's a magical place, hidden, as you can see in image nr 2.

Also there are two big underground parkings that serve the area.

That congestion of elements makes it a very concurred place not only by Catalans but also by tourists.



BBVA Catalunya Caixa ①
 Museu Diocesà de Barcelona ②
 Hotel Colón Barcelona ③
 Foment del Treball Nacional ④

Vía Layetana ⑤
 Av. de la Catedral ⑥
 Plaza Antoni Maura ⑦
 Av. Francesc Cambó ⑧
 Carrer Dr. Joaquim Pou ⑨
 Carrer de la Tapineria ⑩

Metro line 1 Neglected station "Banc" ⑪
 Parking Varsa ⑫
 Parking Econet ⑬
 Barcino Wall ⑭

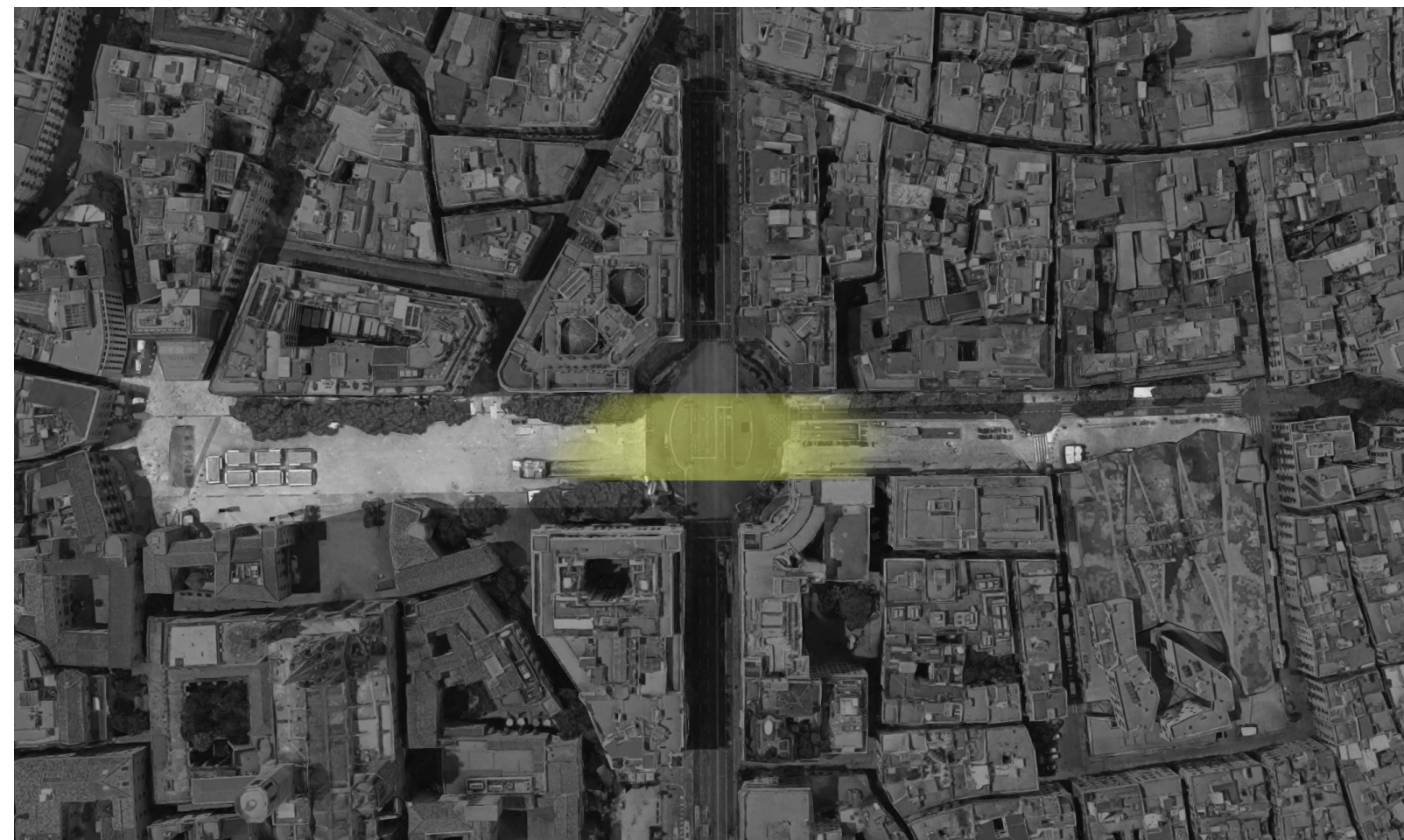
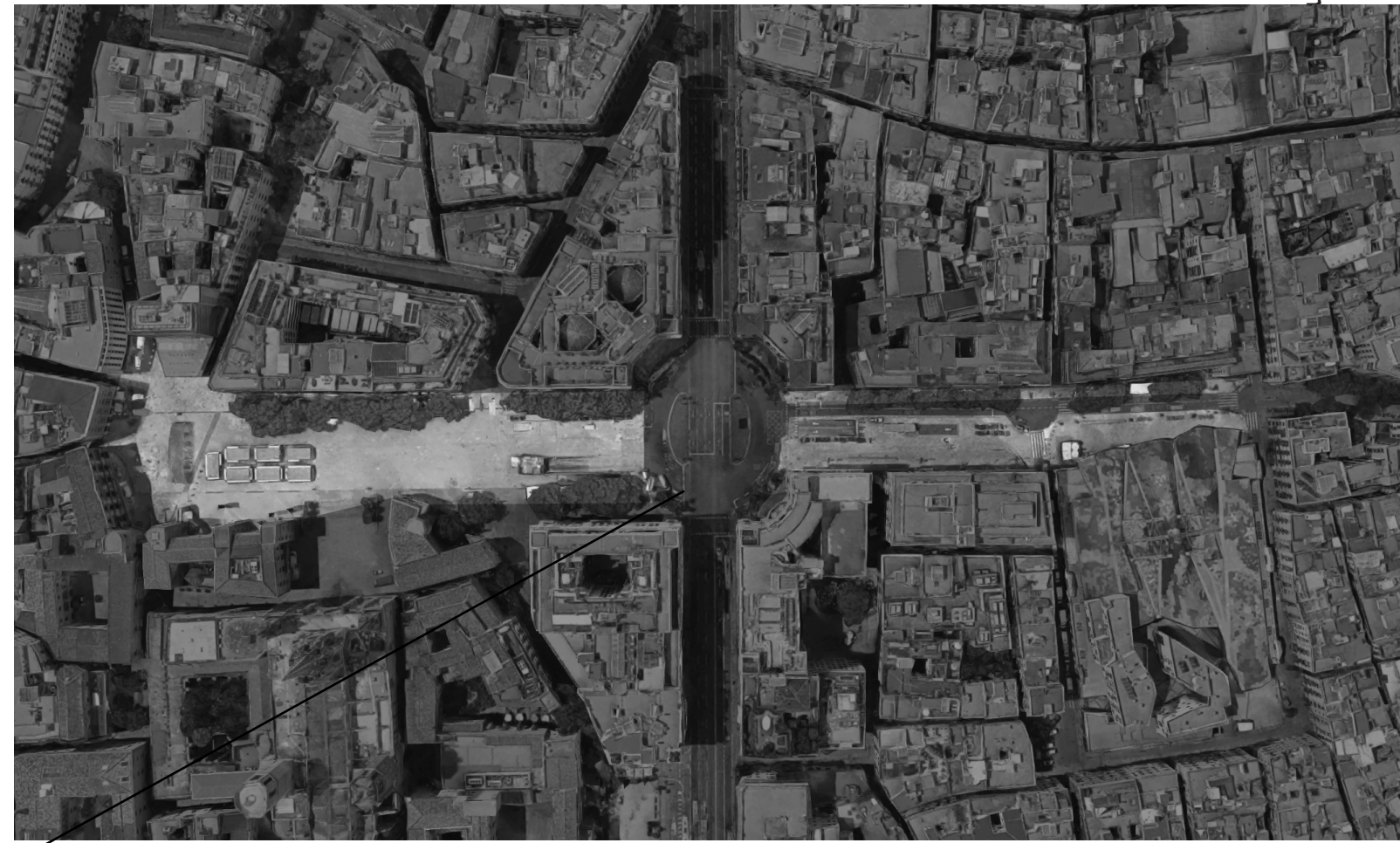
Current situation

The main problem identified in this area is the interruption of flows. Not only the pedestrian flow that is the biggest problem, but also cars. Avinguda de la Cathedral and Avinguda de Francesc Cambó are the names of the two pedestrian walkways being interrupted.

Besides that, the location of the entry of the underground parkings are also blocking the path of pedestrians, and a kind of chaos is generated at that point.

There is a small area or plaza in the middle of the intersection of Via Layetana called Plaza d'Antoni Maura. I wouldn't call it plaza because it is extremely hard for people to access. Its roll may be organizing cars.

Problem



Proposal / Light Strategy

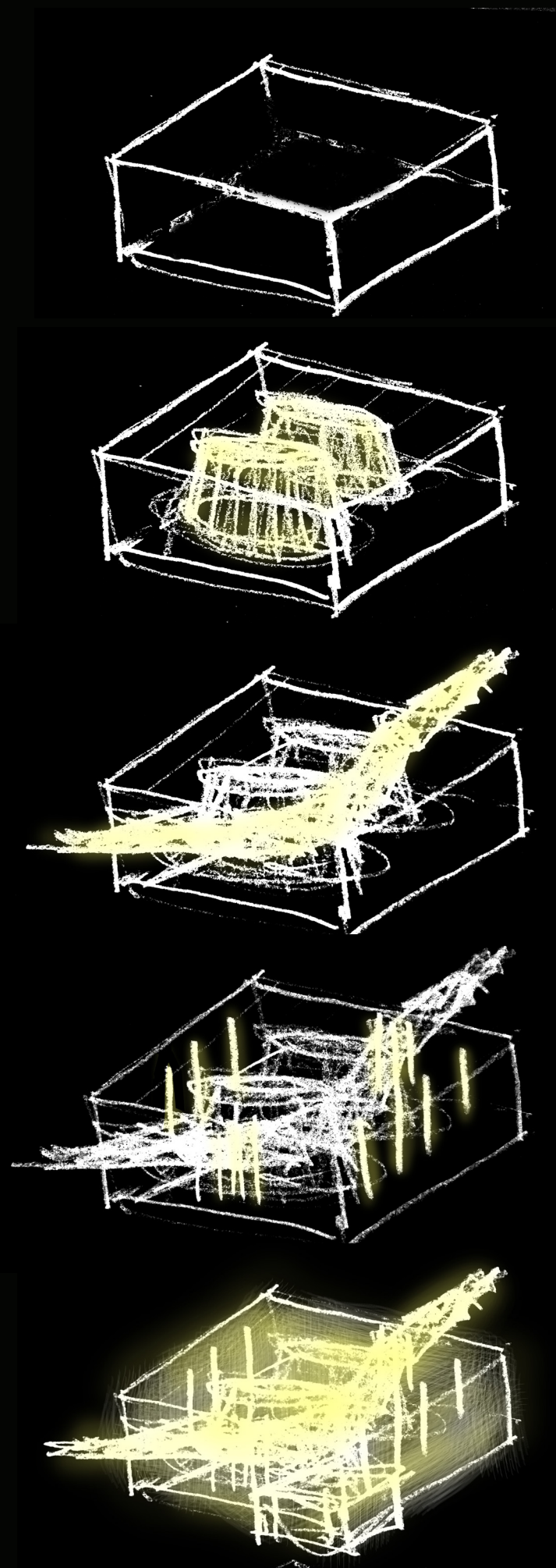
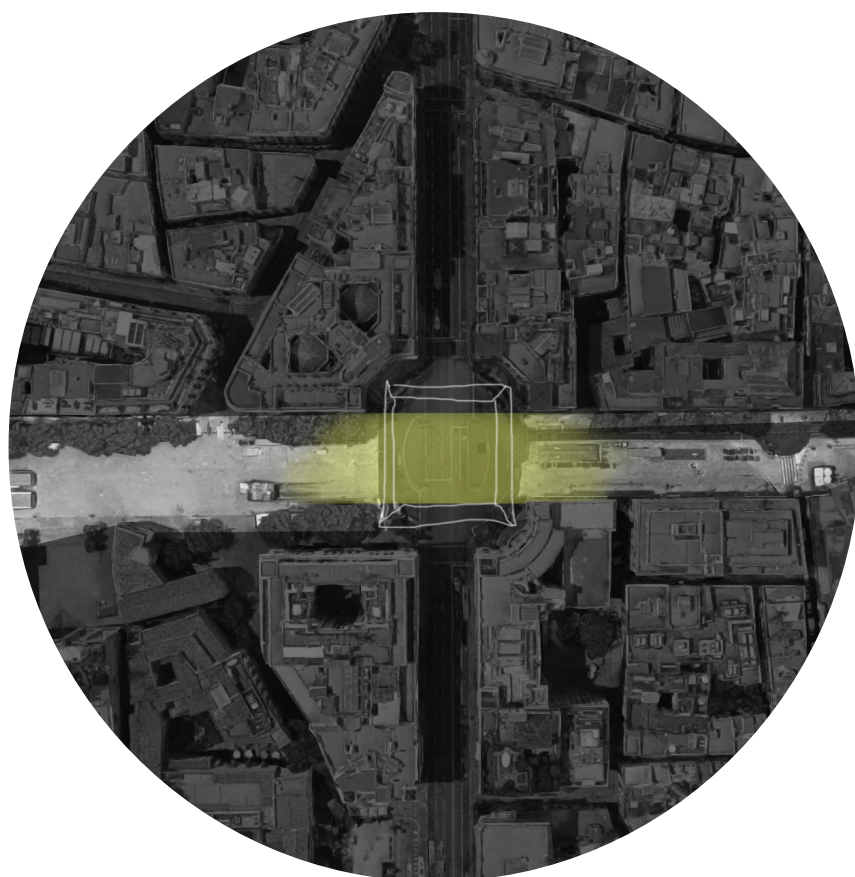
Light will be used to perforate the mass of the underground and create a redirection but continuous and secure flows. As it can be seen in the graphic number 3 where demonstrated how with negative interventions the light will perforate to make an inhabitable space.

The conversion of the plazas into a negative space will make them in direct zenith light providers.

Also, a perforation from one side to the other will create a path of light for the pedestrians.

Small perforations will also be used as filtered illumination to generate a transition in lights, and avoid abruptations.

And as a result obtaining a space flooded by light.



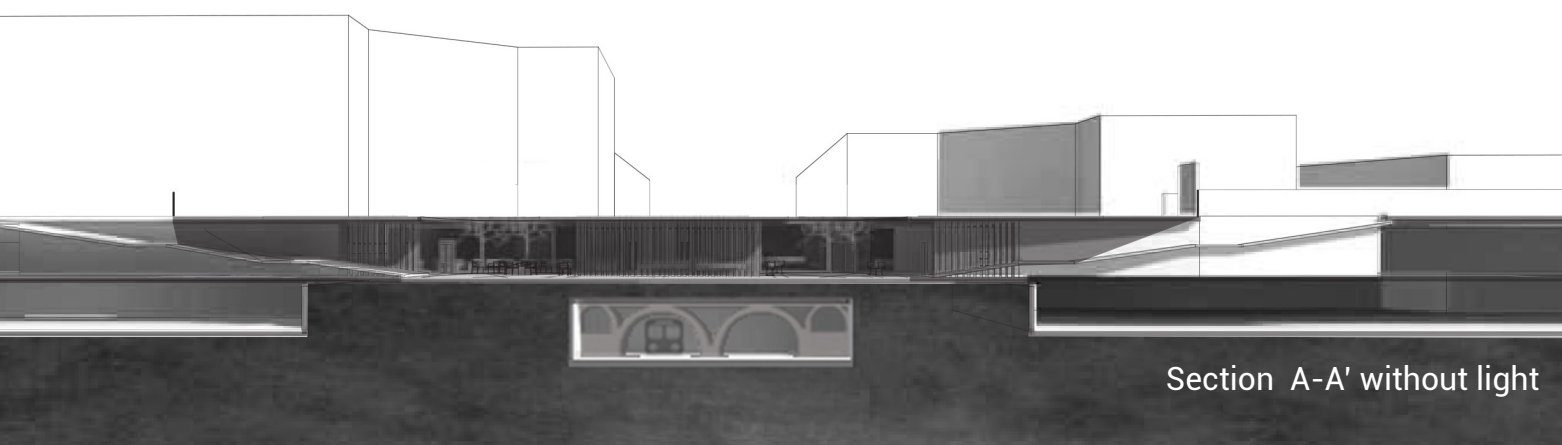
Proposal

The distribution of the space will be determined by the light and how it enters. Conditioned by the elements that are above (the two plazas) become now the two main patios of light. They will be the protagonists because they will provide the visual connection with the upper surface. Also, they will be intercepted by the flow axis of pedestrians, the idea is to make it feel as the continuity of the plaza above, so it rains, and perceives the light as pure as in the plazas. So now, cars pass normally over Via Layetana, and people under.

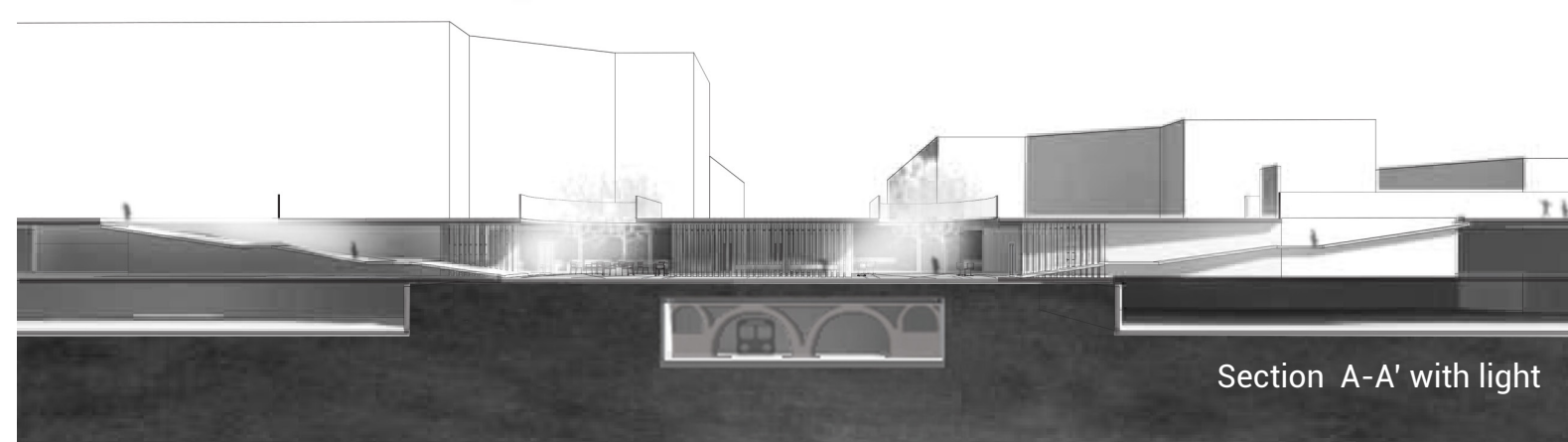
Another attractor to go underground was the abandoned metro. People could now visit it, and re-live history. To take and reclaim neglected spaces by the exposition space, one of the program uses that will be explain in the next page.

In the section a-a, compared to section a-a with no light- its demonstrated how the light will be the protagonist of the place and how it will abolish the "tunnel" and isolation feeling. The complete difference that the light makes when it perforates and invades the place. Its no longer a non-place, it's a place itself now.

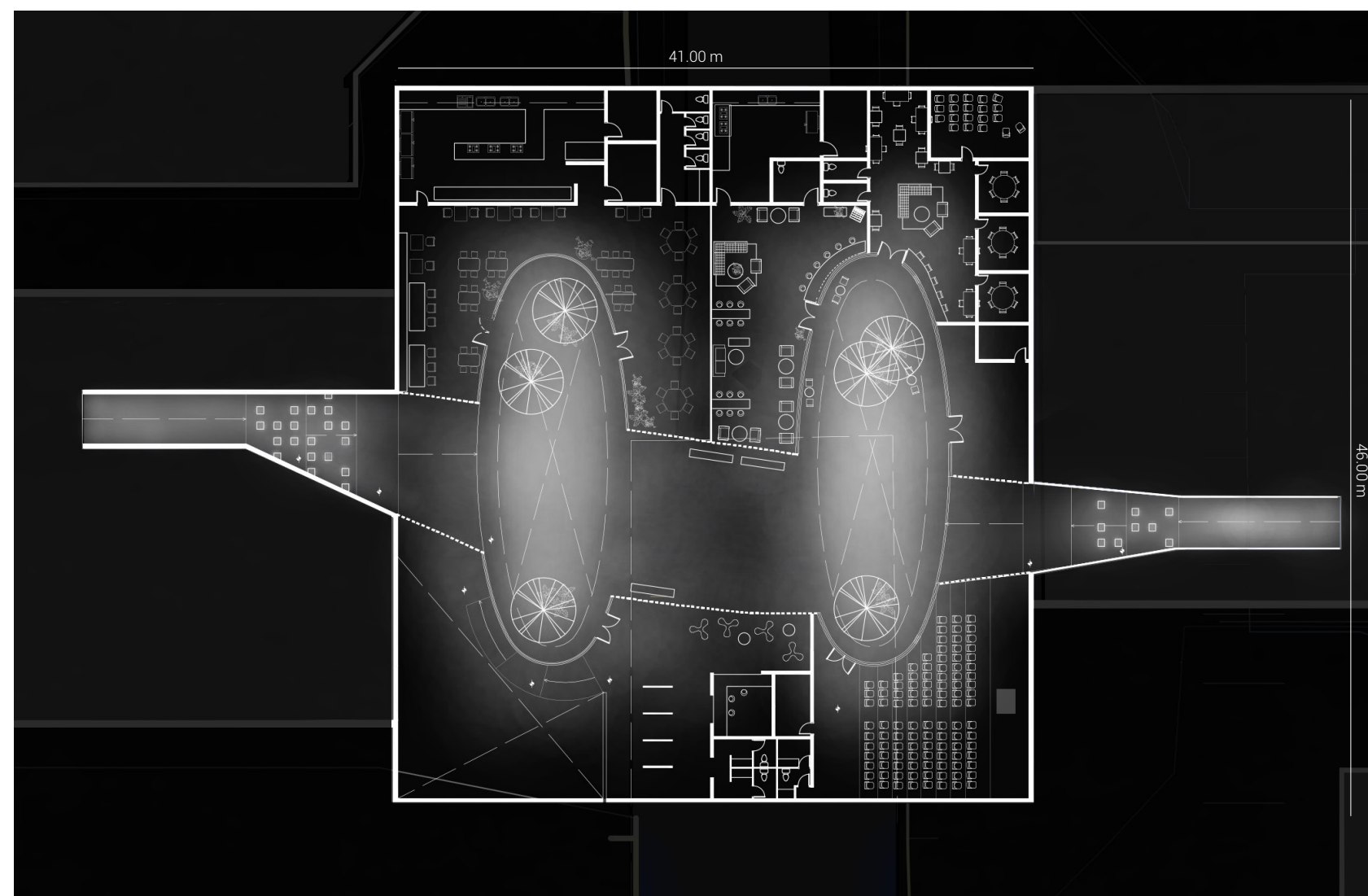
Space for People



Section A-A' without light



Section A-A' with light



Floor plan level -1

Proposal

2

- ① Cafeteria
- ② Restaurant
- ③ Cultural/Shared Offices
- ④ Multiuse room
- ⑤ Auditorium
- ⑥ Exposition space
- ⑦ Visit to antique museum
- ⑧ Patio 1
- ⑨ Patio 2
- ⑩ Access Avinguda de la Catedral
- ⑪ Access Avinguda Jaume
- ⑫ Metro line 1
- ⑬ Parking Saba

The program for the building contemplates a cafeteria, a restaurant, a cultural shared offices space, multiuse room, auditorium, exposition space and metro museum, patio 1 and patio 2.

All this uses are no longer transportation uses; they consist in a program for different periods of permanence. This multiuse fact is for inciting a 24 hour visit and mixing time, people and social classes.

Proposal

Urban Insertion

The project's urban insertion will improve the upper ground, and will dialogue continuously with the preexistences in all the levels. It follows the lines of the pavement, the flows of movement, and the preexisting elements.





Filtered

The accesses to the building are ramps located in the ends of each pedestrian walk way. By the slow submersion, the pedestrian will enter and perceive the underground as a faded limit, not abrupt at all.

The presence of filtered light by the perforation of the pavement will support the slow transition, not only physically but also perceptive.



Direct

The plazas will have the direct light type, and because of its dimensions the people will feel in an exterior. The light will permit the integration with the surface by showing the elements of the top. But still, understanding the location of a lower level.



Re-directed

The redirected light enters as zenithal on the plazas but invades horizontally the interiors thanks to the use of translucent materials such as glass and permeable louvers. The lacks of other horizontal windows in the other walls are intentionally avoided to make the space "shaped" by the perforating light from the sky. When the walls are going far from this source, they become harder and opaque.



Night reaction

The underground now reacts to the changing of daylight. At night, an inverse relation is generated. Now, with the help of the artificial lights, the building underground work as an element of reference for the upper surface.



Conclusion

When starting this underground journey, the research was intended to find solutions for the integration of the underground and at the end it did, but also it ended up being more than that, the light came up as the primordial.

Knowing that light has been studied since the very beginning of architecture, the research discovered that light could offer so much information for the underground architectural world. Taking rolls not only of visibility but the giver of space, the identity etc. Because of the difference with the surface that is a negative space itself it works by blocking the light. And the contrary happens in the subsoil that works by opening for the light. (Explanation in chapter 1 of un-relations).

The research helped also to understand not only the importance of the underground but how the incorporation of it is necessary for the developing of cities. Also it was dis-

covered a big number of elements or spaces in Barcelona's underground. Even though it is a non-place, it holds many elements.

The answer to the question of: Could natural light contribute to recover the underground as an inhabitable human and urban space? Is yes, and by the different chapters it was demonstrated. The light contributes in a large way for the subsoil to become inhabitable and integrated.

The way of light to enter the subsoil offers so many possibilities than imagined. At first, the tree types of light, in my mind were supposed to offer the same results, but no. It ended up being more complex, yet more interesting and profitable after the analysis. It demonstrated once again the important and determining role that architecture has when it comes to light and space.

By fortune, the site selected had a wonderful potential, and it was very helpful for the testing of the analysis. It was a parallel of testing and investigating. I am pretty sure that in many cities there are many places with similar circumstances as this one. Taking the theory to an actual project gave more results, such as the importance of the extremely dependence that the underground is to the above. But if you think about it, in the surface above the same happens, everything is divided by plots, lines: conditioned; simply this division in the underground is in vertical, not in horizontal. Change of paradigms.

The importance of this research is evident because is a topic that not all cities have implemented or really worked on, as for example Barcelona. A lot has been said about light in architecture, but very few about light as an integrator for the underground. Understanding the light by this quality could be the solution for many spaces and architectural problems. Like for example places that have only the possibility of zenithal entrance of light that urge of connections or eliminating non-places.

I hope this investigation is useful for others and I hope it will incite



further investigations. Obtaining the results, other questions and new topics arise that could work as a start to some future researches, as for example: Psychological and paradigms related to the underground; Light as identity; Study of the change of levels with the manipulation of light; Specific study of the types of light; Other alternatives of the recuperation integration of the underground world.

The idea is for architects to take these strategies of intervention with the light to understand how it could work. Use these tools and make them your own and belong to each place, in each project for its location and each project's intention.

I would like to end the research with this quote that states our dependency as humans to natural light.

Even a room which must be dark needs at least a crack of light to know how dark it is.
Louis Kahn



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